

REMARKS

Claim 12 remains in the application, all original claims 1-11 having been previously cancelled. Claim 12 has been amended as noted herein above.

Claim Rejections - 35 USC § 103

The Examiner States:

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Marter et al. (**US Patent No. 3,303,125**).

The Marter reference discloses a process for producing a non-toxic aromatic oil comprising: the steps of pre-blending no more than 80% by weight an extract from a lube plant in a distillate and hydrotreating the pre-blend in a hydrotreater wherein a hydrotreating catalyst is selected from the group consisting of Nickel-Molybdenum and Nickel-Cobalt, and said hydrotreating process is performed at a temperature in the range of 400-700 F and a pressure in the range of 10-100 bar (145-1450 psi). See Column 1, lines 1-40 and Column 2, lines 1-27.

The reference does not disclose a less than one mutogenicity index by Modified Ames Test, a minimum of 10% penta chlorophenol solubility, and a density between 0.89-0.94 g/cc at 60 F. The reference does not disclose the full range of temperature ranging from 500-750 F and the full range of pressure ranging from 500-1500 psi.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize non-toxic aromatic oils with less than one mutogenicity index by Modified Ames Test, a minimum of 10% penta chlorophenol solubility, and a density between 0.89-0.94 g/cc at 60 F because these variables are typical of non-toxic aromatic oils, because the steps utilized to make these non-toxic aromatic oils are disclosed by the reference, and because the reference discloses oils with high density, high aromatics, and negligible acidity. See Column 1, lines 19-22. It would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize the full range of temperature ranging from 500-750 F and the full range of pressure ranging from 500-1500 psi because overlapping ranges are disclosed by the reference and it would be appropriate to modify the range such that is effective for producing non-toxic aromatic oil.

This rejection is, respectfully, traversed.

The major difference between the prior art and Applicants' invention is as follows: In the prior art, Marter mixes "a light distillate" with "a light extract" and does hydrotreating. This, in Applicants' experience does not lead to a non-carcinogenic product. Applicants, on the other hand, have blended "a heavy extract" with "a light distillate" and hydrotreated. This not only leads to a non-carcinogenic product, but also has sufficient pentachlorophenol solvency. Marter, on the other hand, seems to make a high aromatic, hydrotreated product but does not show any non-carcinogenicity data. But, at present this property is extremely important. Additionally, the prior art does not show pentachlorophenol solvency test.

The Marter reference is concerned with a process for preparing petroleum-lubricating oils of increased aromaticity. Further, the product was intended to have a high density, high refractive index, a high percentage of aromatic hydrocarbons, negligible acidity, and a pale color. However, the Marter reference does not disclose a process for producing a non-toxic aromatic oil [Column 1, lines 1 – 40].

Also, one skilled in the art understands the screening tests, such as Modified Ames and IP-346, are relatively recent developments. The Modified Ames was developed and validated in the 1980's. The test became generally accepted and the ASTM method was published in the 1990's. The IP-346 assay was also developed in the 1990's in Europe. The earliest concerns about oil carcinogenicity actually came from observations in the first half of this century of tumors in certain occupational groups. Toxicology testing was originally via whole animal studies, particularly the mouse skin painting study which remains the "gold standard" today. Surrogate assays are tested against the lifetime mouse skin painting procedure to establish their validity and predictability.

Prior to the Modified Ames test there was no true surrogate test that Applicants are aware of, although it was generally accepted that highly refined oils were less carcinogenic and degree of refining was generally judged by physical chemical parameters such as UV or visible light absorbance. The Marter reference does not mention any physical data nor any animal testing data supporting such non-toxic nature of the oil produced.

It is not obvious to one having ordinary skill in the art that how an oil comprising more than 1 % sulfur and comprising high aromatic hydrocarbon of light distillate could be non-toxic. The light distillate color clearly indicates a product containing a significant number of three-membered aromatic rings. The pale color of an oil is not indicative of a non-toxic product.

In fact, Applicants' earlier studies [see Table below, Feed A, Run # A] showed that light distillate with light extract (a product cited by Marter) do not yield a non-carcinogenic product as indicated by Modified Ames Test. For example, light distillate (70 weight %) was mixed with light lube extract (30 weight %) and hydrotreated. The product so obtained gave a mutogenicity index 1.57, much greater than the non-carcinogenicity requirement of < 1 .

In the present invention, Applicants have shown a product with a low sulfur level, along with sufficient aromaticity to dissolve minimum of 10% pentachlorophenol, while maintaining a mutogenicity index of less than one. In addition, high aromaticity alone is not indicative of high pentachlorophenol solubility. Thus, it is not an obvious property unless solvency of pentachlorophenol solubility is reported [please refer to "Description of the preferred embodiments" section]. To the best of Applicants' knowledge, there is no non-carcinogenic lubricating boiling range oil which meets the 10 % pentachlorophenol solvency. However, there are several lubricating boiling range oils which meet 10 % pentachlorophenol solvency, but are high aromatic and are carcinogenic.

Overall, Applicants have clearly shown the product produced in the present invention passes 10% pentachlorophenol and passes the non-carcinogenic tests. Further, to date there is no non-toxic oil, wherein one could dissolve 10% pentachlorophenol. This distinguishes Applicants' process from the cited Marter process.

Additional Test Results

Sample	Description	Hydrotreating Conditions			S ppm	N ppm	UV Aromatics, mmol/100g							MI*
		Space Velocity	T °F	H ₂ psi			Total aromatics	Diphus aromatics	Benzenes	Naphthalenes	Phenanthrenes	Chrysenes	Tetraphrenes	
	Lube atmospheric light distillate used as a feed component				3230	129	70.40	1.46	68.94	1.09	0.23	0.12	0.02	
	Lube light extract stream used as a feed component				13100	8590	233.52	146.15	87.37	64.42	57.31	16.84	7.58	
	Feed A: Light Distillate : Light Extract::70:30)				6541	2712	120.02	43.16	76.86	19.63	15.37	3.04	5.12	
	Run # A	0.5	550	1000	1850	2570	129.21	40.65	88.56	21.70	8.56	7.51	2.88	1.57
	Lubricant atmospheric distillate used as a feed component				3230	129	70.40	1.46	68.94	1.09	0.23	0.12	0.02	
	Lubricant heavy extract stream used as a feed component				13100	11400	211.50	137.22	74.25	41.66	45.20	33.07	17.29	2.20
	Feed 1. (Distillate:Extract::75:25)				5800	2810	102.60	35.20	67.35	11.73	11.38	8.02	4.07	
	Run # 1	0.5	550	1000	2340	3670	129.50	41.39	88.14	16.73	12.72	7.94	4.00	0.77
	Feed 2. (Distillate:Extract::80:20)				5420	2270	109.80	30.72	79.09	10.62	9.70	6.89	3.51	
	Run # 2	0.5	550	1000	2040	2890	126.90	35.20	91.74	14.60	10.65	6.65	3.30	0.80
	Run # 3	0.5	600	1000	818	2790	121.60	27.16	94.41	10.88	8.21	5.69	2.38	
	Run # 4	0.5	550	1000	2080	3110	126.24	36.55	89.69	15.03	10.99	7.01	3.52	
	Feed 3. (Distillate:Extract::85:15)				4550	1610	95.30	22.71	72.58	8.13	7.04	5.02	2.52	
	Run # 5	0.5	550	1000	1520	2160	111.50	25.03	86.46	10.44	7.49	4.74	2.36	
	Run # 6	1	500	1000	3650	2060	106.57	25.37	81.20	10.37	7.58	4.90	2.52	
	Run # 7	1	550	1000	2150	1990	104.30	23.24	81.06	9.67	6.87	4.39	2.31	0.68
	Run # 8	1	550	900	2280	1890	104.08	23.57	80.51	9.80	6.95	4.46	2.36	
	Run # 9	0.5	550	900	1790	2400	118.09	27.53	90.56	11.59	8.08	5.20	2.66	
	Run # 10	1.5	550	1000	3420	1820	98.20	21.29	76.86	8.58	6.43	4.13	2.15	0.67

CONCLUSIONS

Claim 12 is the sole remaining claim in the application and has been rewritten as noted above, now obviating the Examiner's rejections.

Applicants respectfully request reconsideration of claim 12 and submit that, in view of the amended claim and arguments presented herein, the Examiner's rejection of the claims under 35 U.S.C. § 103 has been overcome. The Examiner is respectfully requested to withdraw the rejection. It is submitted that Claim 12, as now presented, is proper for allowance, which allowance is respectfully requested.

It is believed that no additional fees are due at this time. If this is in error, the Commissioner is hereby authorized to charge any such fee to Deposit Account No. 19-1800.

If the Examiner feels that a telephone conversation would assist in bringing this case to a conclusion, he is requested to contact the undersigned at 713-782-3620.

Respectfully submitted,

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